# Noteworthy bird observations in Alta Verapaz, Guatemala

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Basic studies of the avifauna in previously unsurveyed areas of dpto. Alta Verapaz, Guatemala, were conducted between August 1997 and March 2002, with long-term bird monitoring based on monthly point counts established in December 2001. The principal results of the research will be published elsewhere. Here I provide distributional data for rare and little-recorded species, and records that represent altitudinal range extensions.

## Study areas and methods

Alta Verapaz, in Guatemala, is characterised by the transition from cloud forest (<2,500 m) to lowland rainforest. The observations described herein were made in the following areas (see Fig. 1).

Ik'bolay region (midpoint 15°51'N, 90°35'W): a small montane area in the northernmost foothills of the Sierra de Chamá, 170–700 m, at the north edge of the floodplain of the río Ik'bolay; humid evergreen broadleaf forest. Study periods: 26 August–5 September 2001, 14–25 January 2002, and December 2001–July 2004 (monthly point counts).

Cerro Peyán in Laguna Lachuá National Park (midpoint 15°50'N, 90°40'W): part of the northern foothills of the Sierra de Chamá, 170–700 m; humid evergreen broadleaf forest. Study periods: 23 July 2001, 25 May 2002, and December 2001–July 2004 (monthly point counts).

Sierra Sacranix (midpoint 15°30'N, 90°30'W): part of the Sierra de Chamá, largely uninterrupted transition from humid evergreen broadleaf forest at 400 m to cloud forest at 1,800 m; primary forest covers *c.*200 km$^2$, largely undisturbed owing to absence of human infrastructure. Study periods: 12–19 October 2001, 11–20 March 2002, and December–June 2004 (monthly point counts).

Pampajché (15°25'N, 90°35'W): humid evergreen broadleaf forest at 1,300–1,500 m (low-altitude cloud forest). Study period: 30 May–2 June 2000.

Yalijux (15°20'N, 90°05'W): (1) humid evergreen broadleaf forest at 2,000–2,500 m (high-altitude cloud forest), study period: 7–8 November 2000; and (2) humid evergreen forest at 600–1,000 m, study periods: September 2001, February 2002, 21 February 2002 and 31 March 2002.

Guaxac (15°20'N, 90°09'W): (1) humid evergreen broadleaf forest at 1,000–2,000 m (low-altitude cloud forest), study periods: 22–30 September 2001 and 26

February 2001; (2) pine forest at 700–1,000 m, study periods: 22–30 September 2001 and 18–27 February 2002; and (3) shade-coffee plantation under *Inga* sp. at 1,100–1,500 m, study periods: 22–30 September 2001 and 18–27 February 2002.

Caquipec (15°20'N, 90°9'W): humid evergreen broadleaf forest at 2,000–2,400 m (high-altitude cloud forest), study period: September 1997–October 1998.

The records described herein are results of casual observations and audio-visual point counts (Bibby *et al.* 1992) with a duration of ten minutes at each point and a minimum distance of 200 m between points. Censusing was conducted under the

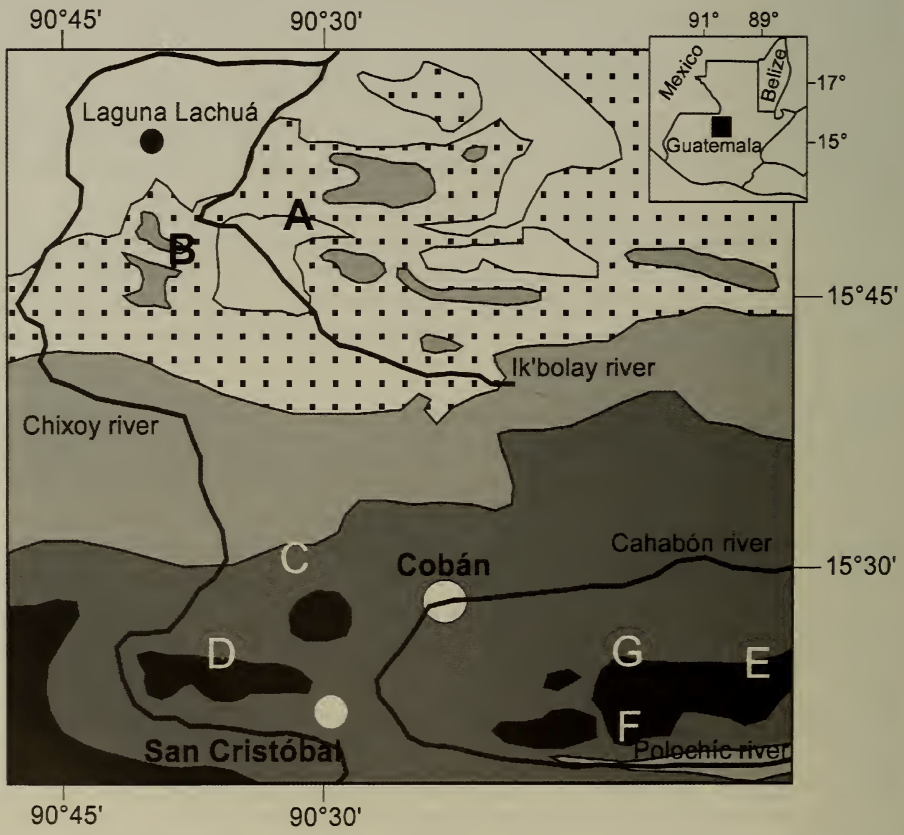


Figure 1. Location of the study sites, altitudinal zones, major rivers and the towns of Cobán and San Cristóbal Verapaz. The inset map shows the location of the study area in Guatemala. Study sites: A–Ik'bolay region, B–Cerro Peyán, C–Sacranix range, D–Pampajché, E–Yalijux, F–Guaxac, G–Caquipec. Altitudinal zones: black 1,800–2,500 m, dark grey 1,000–1,800 m, pale grey 500–1,000 m, dotted 250–500 m, white <250 m.

most favourable weather conditions (no rain, no or light wind), between 0545 h and 0930 h. Point counts were conducted, in part, as fixed-radius counts, and in part with distance estimates (distance sampling, Buckland *et al.* 2001). From the latter, densities were calculated with software Distance 3.5 (Thomas *et al.* 1998). I fitted half-normal and hazard rate models to the data and used the Akaike Information Criterion (AIC) to select the model with the best fit (Buckland *et al.* 2001). Coordinates of locations were obtained using a hand-held GPS. Details concerning relevant methodologies are indicated in the species accounts, as they differ between species. Species nomenclature follows AOU (1998).

## Species accounts

**HIGHLAND GUAN** *Penelopina nigra*

Common (daily observations) at all sites with humid evergreen broadleaf forest above 900 m (Sacranix, Pampajché, Guaxac, Caquipec and Yalijux). Never observed in coffee plantations or secondary scrub. In Caquipec and Yalijux, observations were made in low-canopy (15 m) secondary forest, adjacent to primary cloud forest. Highland Guan is commonest above 1,000 m (Andrle 1967b, Howell & Webb 1995, González-García *et al.* 2001, Komar 2002). An observation of three females at the unusually low altitude of 700 m was made on 31 March 2002, in Yalijux. Several low-altitude observations are available from Mexico: at 460 m in Oaxaca (Hoffmeister 1951), at 300 m in El Triunfo (González-García *et al.* 2001), and at 500 m (Álvarez del Toro 1980), who did not mention an observation site. Further research is needed to determine if Highland Guan is, in part, an altitudinal migrant.

Breeding was observed at two study sites. In Pampajché a nest with one egg was found on 31 May 2000 (photographed), *c.*3 m above ground in a small tree. The female was incubating. In Sacranix a pair was seen together with a mid-sized juvenile, already able to fly, on 30 June 2003. Although there are historic reports from Alta Verapaz (Salvin & Godman 1897–1904), more recent accounts did not mention the region as being within the species' range (Baepler 1962, Vannini & Rockstroh 1997). My data close a gap in our knowledge of the modern distribution of Highland Guan in central Guatemala.

**SOLITARY EAGLE** *Harpyhaliaetus solitarius*

Rare in northern Middle America (Howell & Webb 1995). I observed the species very well in the Sierra Sacranix (15°31'N, 90°30'W). On 13 October 2001 I saw two adults flying together, 40 m above ground over a small clearing; shortly afterwards, they began to ascend while soaring. Howell & Webb (1995) emphasised the difficulty in distinguishing Solitary Eagle from either of the black hawks, *Buteogallus anthracinus* and *B. urubitinga*, and consequently doubted some records from southern Mexico and Guatemala published since the 1980s. However, the long head in comparison to the body and the heavy bill distinguished those I observed

from Common Black Hawk *B. anthracinus*, which also occurs in Sacranix. Additionally, I am very familiar with both *Buteogallus* through frequent observations on the Guatemalan Atlantic coast, at Punta de Manabique in the same year. I believe that the individuals I saw were Solitary Eagles, but I am aware that even observers experienced with raptors erroneously identify this species in the field. Together with Claudia Avendaño, Victor Xi Poou, Efraín Pop Chub and Ernesto Col, I made a further observation in Sacranix on 27 May 2003. At a small forest clearing we observed a raptor of the colour and shape of Solitary Eagle or Common Black Hawk, flying straight and fast, 200 m above the canopy. It called *ple-ple-ple...*, similar to the transcription in Howell & Webb (1995) for Solitary Eagle. I have never heard a similar call from Common Black Hawk, making me believe that it was a Solitary Eagle. Formal documentation of this species from Sacranix, either with photographs or sound recordings, is nonetheless required.

**RESPLENDENT QUETZAL** *Pharomachrus mocinno*

Common (daily observations) at all sites with humid broadleaf forest above 900 m (Pampajché, Sacranix, Guaxac, Caquipec, Yalijux), and also seen in low-canopy (15 m) secondary forest, adjacent to primary cloud forest. On 19 March 2002, quetzals were observed at an unusually low elevation in Sierra Sacranix, where intensive display (flights, song and calls) of at least ten birds was observed at 950 m. In northern Central America the species is considered resident at 1,400–3,000 m (Howell & Webb 1995). Records at low elevations are known only from the non-breeding season, due to altitudinal migration (Wheelwright 1983, Loiselle *et al.* 1989, Powell & Bjork 1994, Solórzano 1995, Paiz 1996). In Guatemala breeding is reported in March–June (Unger 1988, LaBastille *et al.* 1972, Paiz 1996, pers. obs.).

**KEEL-BILLED MOTMOT** *Electron carinatum*

Recorded at Cerro Peyán and in the Ik'bolay region. On 24 August 2001, two were observed (KE, Efraín Caal), *c.*8 m above ground, in the lower canopy of humid evergreen forest bordering the floodplain of the río Ik'bolay at 250 m (15°50'N, 90°35'W). Our attention was drawn by their short call. They were easily recognised by their broad bill, which is much wider than in Blue-crowned Motmot *Momotus momota* (the most abundant motmot at Ik'bolay and Cerro Peyán), and we also observed the large chest spots and different face pattern. Additionally, the bare shafts in the central rectrices were much shorter than in Blue-crowned Motmot. On 25 May 2002 two were heard in humid evergreen forest in the foothills of Peyán, at 250 m (15°50'N, 90°39'W, KE, Claudia Avendaño, Efraín Caal, Roberto Caal, Javier Caal). The distance between these observations is 7 km. On each of the following dates during monthly bird counts a calling bird was recorded at Cerro Peyán and the Ik'bolay region by E. Caal, R. Caal and J. Caal: 2002 (20 July, 4 August, 6–7 October); 2003 (8 January, 5 April, 13 April, 12 June, 6 October); 2004 (5 January, 11 April, 12 June). All observations were within a radius of 2 km of the first sighting.

The species is considered Vulnerable due to the small size of its fragmented populations (Hilton-Taylor 2000, BirdLife International 2004). Recently, there has been an increase in the number of observations of Keel-billed Motmot (Howell & Webb 1992, 1995, Miller & Miller 1996). In Guatemala, Keel-billed Motmot has been recorded at Laguna Perdida and Tikal, Petén (Smithe 1966, Collar *et al.* 1992), and at Cerro San Gil, Izabal (Howell & Webb 1992, Robbins & Dowell 1996). Miller & Miller (1996) mentioned an 'anecdotal historical' record near the río Chixoy, but provided no specifics. This record is probably based on an uncertain observation mentioned in Salvin & Godman (1888–1904) at Santa Ana, presumably 10 km south of San Cristóbal Verapaz (Godman 1915, Collar *et al.* 1992) (Fig. 1). Our recent observations confirm that the species is present in the northern foothills of the Sierra Chamá. It was not recorded in foothills with humid evergreen forest or at higher elevations in the Sierra Sacranix.

**SLATE-COLOURED SOLITAIRE** *Myadestes unicolor*

Inhabits montane humid evergreen and pine–oak forest at 800–2,700 m (Howell & Webb 1995, Stotz *et al.* 1996), and is an altitudinal migrant, reaching close to sea level in winter (Howell & Webb 1995). Andrle (1967a) reported the species at 400 m and S. N. G. Howell (pers. comm.) near sea level in the Sierra de los Tuxtlas, Mexico, in November–February.

At Cerro Peyán singing individuals were recorded on 23 July 2001 and on 7 October 2004, at 400 m. In the Ik'bolay region, two singing birds were recorded on 30 August 2001, at 500 m. No other observations were made at these sites in December 2001–October 2004. In the Sierra Sacranix it was common between 500 and 1,800 m. During a fixed-radius (40 m) point count survey in mid-March 2002 (28 points at 520–650 m, 12 at 850–1,350 m), I recorded a mean 0.4 ± 0.6 (SD) individuals per point at low elevation, and 1.6 ± 0.8 individuals at high elevation. The solitaire was recorded on 39% of the points at low and on 92% of the points at high elevation.

The following nesting data are from Sacranix: (1) nest with two eggs, adult incubating on 28 May 2003, at 1,480 m; (2) nest with two eggs, adult incubating on 28 July 2003, at 1,300 m; (3) juvenile with scalloped head and breast (see Howell & Webb 1995) in forest midstorey on 30 July 2003; (4) completed nest without eggs on 22 July 2004, nest with two eggs and incubating adult on 7 August 2004, at 1,450 m. No nests were found at lower elevations.

Point counts with distance estimation were conducted in December 2003–July 2004 at 520–650 m and 1,200–1,700 m. To calculate densities repetitions of points were pooled taking into account number of visits (Buckland *et al.* 2001). Based on nesting dates, I assume that May–July is the main breeding season. I calculated densities for both altitudinal classes during the assumed breeding and non-breeding seasons (December–March). At low elevation, 22 points were sampled 2–4 times in December–March and 3–4 times in May–July. At high elevation, 55 points were sampled 2–4 times during the non-breeding and 1–4 times in the breeding season.

TABLE 1

Number of individuals detected, encounter rate of individuals or flocks per point count (95% confidence level), and density of individuals or flocks respectively (95% confidence level) of Slate-coloured Solitaire *Myadestes unicolor* and Common Bush-tanager *Chlorospingus ophthalmicus* during the breeding and non-breeding seasons at two different altitudes in the Sierra Sacranix. Sample size (number of individuals or flocks) and effort (number of point counts) are indicated.

| | **Parameter** | **Non-breeding** | **Breeding** |
|---|---|---|---|
| Slate-coloured Solitaire *Myadestes unicolor* | | | |
| | | 18 December 2003–6 April 2004 | 3 May–22 July 2004 |
| 520–650 m | No. of individuals detected | 104 | 52 |
| | No. of count points | 22 | 22 |
| | No. of counts | 71 | 71 |
| | Density (individuals/ha) | 6.0 (4.3–8.3) | 2.2 (1.4–3.3) |
| | Encounter rate | 1.5 (1.2–1.7) | 0.7 (0.6–0.9) |
| | | 10 December 2003–31 March 2004 | 6 May–23 July 2004 |
| 1,200–1,700 m | No. of individuals detected | 515 | 548 |
| | No. of count points | 55 | 55 |
| | No. of counts | 208 | 195 |
| | Density (individuals/ha) | 6.9 (6.1–7.8) | 9.3 (6.1–14.4) |
| | Encounter rate | 2.5 (2.3–2.7) | 2.8 (2.6–3.0) |
| Common Bush-tanager *Chlorospingus ophthalmicus* | | | |
| | | 18 December 2003–5 March 2004 | 4 April–22 July 2004 |
| 520–650 m | No. of flocks detected | 28 | 8 |
| | No. of count points | 22 | 22 |
| | No. of counts | 67 | 87 |
| | Density (flocks/ha) | 4.6 (2.8–7.6) | – |
| | Density (individuals/ha) | 11.9 (7.1–19.7) | |
| | Encounter rate (flocks) | 0.4 (0.3–0.6) | – |
| | | 10 December 2003–7 March 2004 | 25 March–23 July 2004 |
| 1,200–1,700 m | No. of flocks detected | 191 | 229 |
| | No. of count points | 55 | 55 |
| | No. of counts | 167 | 250 |
| | Density (flock/ha) | 10.1 (8.7–11.8) | 8.2 (7.0–9.5) |
| | Density (individuals/ha) | 26.1 (22.2–30.6) | 22.7 (19.4–26.6) |
| | Encounter rate (flocks) | 1.1 (1.0–1.3) | 0.9 (0.8–1.0) |

At high elevation density was higher in the breeding season and at low elevations density was higher during the non-breeding season (Table 1), supporting the assumption that birds move to lower elevations in the non-breeding season. However, density was also relatively high (2.2 birds/ha) at low elevations in the

breeding season, perhaps indicating that Slate-coloured Solitaire breeds below 700 m in Sacranix, although no nest was found at this altitude. In further studies mist-netting should be conducted to investigate breeding condition of adults (brood patch, cloacal protuberance; see Mason 1938).

**COMMON BUSH-TANAGER** *Chlorospingus ophthalmicus*

The most abundant species in the bird community of high-altitude cloud forest in Caquipec, at 2,000–2,400 m (Eisermann 1999). In the Sierra Sacranix it was recorded at the unusually low elevation of 550 m, on 14 March 2002. Fledged juveniles were observed on 2 May 2004 in the Sierra Sacranix, and on 15 May 1998 on Caquipec (Eisermann 1999). In Costa Rica incubation and nestling time occupies *c.*27 days (Skutch 1967). Taking into account pair formation and nest building, the low-elevation record falls immediately prior to the start of the nesting season. Common Bush-tanager is common above 1,000 m in northern Middle America, with altitudinal migration to near sea level noted in Los Tuxtlas, Mexico, in winter (Howell & Webb 1995).

Point counts with distance estimation were conducted in the Sierra Sacranix from December 2003 to July 2004, at 520–650 m and at 1,200–1,700 m. At low elevation, 22 points were sampled 2–4 times in December–March, and 3–5 times in April–July. At high elevation, 55 points were sampled 1–4 times during the non-breeding and 2–5 times during the breeding season. Late March–July was assumed to be breeding season.

Common Bush-tanager was more abundant at higher than lower elevations (Table 1). At low elevation it was more abundant in the non-breeding than in breeding season, suggesting downslope migration. With only eight records during 87 point counts in breeding season, calculation of reliable density estimates was impossible. Nesting at low elevation cannot be precluded and should be investigated using mist-netting in future studies. At high elevation, density was found to be slightly higher in the non-breeding than in the breeding season (Table 1).

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References:

Álvarez del Toro, M. 1980. *Las aves de Chiapas*. Univ. Autonoma de Chiapas Tuxtla Gutierrez, Mexico.

Andrle, R. F. 1967a. Birds of the Sierra de Tuxtla in Veracruz, Mexico. *Wilson Bull.* 79: 163–187.

Andrle, R. F. 1967b. Notes on the Black Chachalaca (*Penelopina nigra*). *Auk* 84: 169–172.

American Ornithologists' Union (AOU). 1998. *Check-list of North American birds*. Seventh edn. AOU, Washington DC.

Baepler, D. 1962. The avifauna of the Soloma region in Huehuetenango, Guatemala. *Condor* 64: 140–153.

Bibby, C. J., Burgess, N. D. & Hill, D. A. 1992. *Bird census techniques*. Academic Press, London.

BirdLife International. 2004. *Threatened birds of the world 2004*. CD-ROM. BirdLife International, Cambridge, UK.

Buckland, S. T., Anderson, D. R., Burnham, K. P., Laake, J. L., Borchers, D. L. & Thomas, L. 2001. *Introduction to distance sampling*. Oxford Univ. Press.

Collar, N. J., Gonzaga, L. P., Krabbe, N., Madroño Nieto, A., Naranjo, L. G., Parker, T. A. & Wege, D. C. 1992. *Threatened birds of the Americas: the ICBP/IUCN Red Data Book*. International Council for Bird Preservation, Cambridge, UK.

Eisermann, K. 1999. Avifaunistisch-ökologische Untersuchungen in einer Nebelwaldregion Guatemalas als Grundlage für die Entwicklung eines Biomonitoringprogamms. Diploma. Univ. Applied Sciences Eberswalde.

Godman, F. D. 1915. *Biologia Centrali-Americana. Introductory volume*. Taylor & Francis, London.

González-García, F., Brooks, D. M. & Strahl, S. D. 2001. Historia natural y estado de conservación de los Cracidos en Mexico y Centroamérica. Pp. 1–50 *in* Brooks, D. M. & González-Garcia, F. (eds.) *Cracid ecology and conservation in the new millennium*. Misc. Publ. Houston Mus. Nat. Sci. 2.

Hilton-Taylor, C. 2000. *2000 IUCN Red List of threatened species*. IUCN, Gland & Cambridge, UK.

Hoffmeister, D. F. 1951. A western record of the quetzal, *Pharomachrus mocinno mocinno*, and chachalaca, *Penelopina nigra*, in Mexico. *Auk* 68: 507–508.

Howell, S. N. G. & Webb, S. 1992. New and noteworthy bird records from Guatemala and Honduras. *Bull. Brit. Orn. Cl.* 112: 42–49.

Howell, S. N. G. & Webb, S. 1995. *A guide to the birds of Mexico and northern Central America*. Oxford Univ. Press.

Komar, O. 2002. Birds of Montecristo National Park, El Salvador. *Orn. Neotrop.* 13: 167–193.

LaBastille, A., Allen, D. G. & Durrell, L. W. 1972. Feather structure and behavior of the Quetzal. *Auk* 89: 339–349.

Loiselle, B. A., Blake, J. G., Moermond, T. C. & Mason, D. J. 1989. Low elevation record for Resplendent Quetzals in Costa Rica. *J. Field Orn.* 60: 86–88.

Mason, E. A. 1938. Determining sex in breeding birds. *Bird-Banding* 9: 46–48.

Miller, B. W. & Miller, C. M. 1996. New information on the status and distribution of the Keel-billed Motmot *Electron carinatum* in Belize, Central America. *Cotinga* 6: 61–64.

Paiz, M. C. 1996. Migraciones estacionales del Quetzal (*Pharomachrus mocinno mocinno* de la llave) en la Sierra de las Minas y sus alrededores: implicaciones para su conservación. Tesis de Licenciatura. Univ. Valle de Guatemala.

Powell, G. V. N. & Bjork, R. D. 1994. Implication of altitudinal migration for conservation strategies to protect tropical biodiversity: a case study of the quetzal (*Pharomachrus mocinno*) at Monte Verde, Costa Rica. *Bird Conserv. Intern.* 4: 161–174.

Robbins, C. S. & Dowell, S. D. 1996. Ornithological research at Cerro San Gil, Guatemala: April 17–30, 1996. National Biological Service, Patuxent Wildlife Research Center, Laurel, Maryland.

Salvin, O. & Godman, F. D. 1888–1904. *Biologia Centrali-Americana. Aves*, vol. 2. Taylor & Francis, London.

Salvin, O. & Godman, F. D. 1897–1904. *Biologia Centrali-Americana. Aves*, vol. 3. Taylor & Francis, London.

Skutch, A. F. 1967. *Life histories of Central American highland birds*. Publ. Nuttall Orn. Cl. No. 7. Cambridge, MA.

Smithe, F. B. 1966. *The birds of Tikal*. Natural History Press, New York.
Solórzano, S. 1995. Fenología de 22 especies arbóreas y su relación con la migración altitudinal del quetzal (*Pharomachrus mocinno mocinno* de la Llave 1832), en la reserva de la Biosfera El Triunfo, Chiapas, México. BSc Thesis. Univ. Nacional Autónoma de México.
Stotz, D. F., Fitzpatrick, J. W., Parker, T. A. & Moskovits, D. K. 1996. *Neotropical birds: ecology and conservation*. Univ. Chicago Press.
Thomas, L., Laake, J. L., Derry, J. F., Buckland, S. T., Borchers, D. L., Anderson, D. R., Burnham, K. P., Strindberg, S., Hedley, S. L., Burt, M. L., Marques, F., Pollard, J. H. & Fewster, R. M. 1998. *Distance 3.5*. Research Unit for Wildlife Population Assessment, Univ. of St Andrews.
Unger, D. 1988. Welche Funktion hat der extreme Sexualdimorphismus des Quetzal (*Pharomachrus mocinno*)? Diploma. Univ. of Tübingen, Germany.
Vannini, J. P. & Rockstroh, P. M. 1997. The status of the Cracidae in Guatemala. Pp. 326–334 *in* Strahl, S. D., Beaujon, S., Brooks, D. M., Begazo, A. J., Sedaghatkish, G. & Olmos, F. (eds.) *The Cracidae: their biology and conservation*. Hancock House Publ., WA.
Wheelwright, N. T. 1983. Fruits and the ecology of Resplendent Quetzals. *Auk* 100: 286–301.

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# Notes on breeding of Salvadori's Teal *Anas waiguiensis* and other birds in Crater Mountain Wildlife Management Area, Papua New Guinea

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The breeding biology of many New Guinea bird species is little known (Beehler *et al.* 1986, Coates 1985, 1990, Mack 1994). For many principally Australian species information on breeding has been inferred from studies and records there (Mack 1994). Coates (1985) noted that the breeding seasons of New Guinea birds can be generally classed as: a) hawks—dry season; b) granivorous grassland and savanna species—wet season; c) insectivores and mixed feeders—late-dry to early-wet season; d) frugivores—all year; and e) waterbirds—late-wet to mid-dry season. However, such generalisations may not be applicable to regions experiencing no distinct seasonal variation in rainfall, such as occurs in the area of this study.

Breeding of birds was recorded in the Crater Mountain Wildlife Management Area (CMWMA), in the Eastern Highlands of Papua New Guinea, during a study of the importance of home-gardens (hereafter gardens; any cleared or historically altered land, principally for agricultural purposes) for insectivorous and nectivorous species. This paper serves to augment information on the breeding biology of some Papua New Guinea birds; in particular that of Salvadori's Teal *Anas waigniensis*. Breeding records, in this area with seasonally unpredictable rainfall, may be of significance to a future understanding of avian breeding biologies in the tropics.